

PATENT APPLICATION

Attorney Docket No. A01280US (98110/)

TITLE OF THE INVENTION

"TOGGLE BOLT DEVICE"

5 INVENTOR(S): Carroll Diaz, a U.S. citizen, of 464 West 47th St.,
Cut Off, LA 70345

CROSS-REFERENCE TO RELATED APPLICATIONS

Not applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

10 Not applicable

REFERENCE TO A "MICROFICHE APPENDIX"

Not applicable

BACKGROUND OF THE INVENTION

1. Field of the Invention

15 The present invention relates to fasteners. More particularly, the present invention relates to a toggle bolt type fastener that can be used for holding or compressing multiple items together such as structural panels, flanges, or the like. Even more particularly, the present invention relates to an improved toggle bolt type fastener device that features an outer body with an inner rotating shaft, rotation of the shaft moving a plurality of locking members between extended and retracted positions or between retracted and extended positions.

2. General Background of the Invention

25 Many types of fasteners have been patented that are designed to extend through multiple panels or wall members or through a single wall member. Such fasteners are designed to form a connection between multiple panels or between opposing sides of a particular panel or wall. Many of these fasteners are known as toggle bolts. Examples of patents disclosing toggle bolts and related fasteners are listed in the following table.

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Pat. #	Title	Issue Date
1,169,635	Pipe Hanger	01/25/1916
3,312,138	Expansion Shell for Rock Bolts	04/04/1967
3,946,636	Toggle Bolt	03/30/1976
4,047,462	Toggle Bolt	09/13/1977
4,079,655	Toggle Bolt	03/21/1978
4,453,845	Base Thrust Anchor Shell Assembly	06/12/1984
4,557,631	Off-Center Rock Bolt Anchor and Method	12/10/1985
5,108,240	Heavy Load Bearing Toggle Bolt	04/28/1992
5,865,559	Float Pins	02/02/1999
6,161,999	Toggle Bolt Device	12/19/2000
6,203,260	Toggle Bolt Assembly With Bolt Centering Spacer	03/20/2001
FR1236,439	Dispositif de soutienement par bil-broche notamment pour plafonds de galeries de mines	06/07/1960
DE1092415	Anke fur den Ankerabau	11/10/1960
DE1936360		05/1970

BRIEF SUMMARY OF THE INVENTION

The present invention provides an improved toggle bolt type device or fastener that can be used to join two members together such as a pair of panels, structures, flanges or the like. For example, the present invention can be used to join two spool pieces with pipe flanges together (see Figure 13) wherein each of the flanges has an opening of a selected diameter. The fastener of the present invention can extend through the openings for holding or fastening the two flanges together.

The apparatus includes an elongated body having first and

second end portions and a central, longitudinal bore that is partially threaded. A first end portion of the body has a socket and a plurality of circumferentially spaced apart, radially extending slots that communicate with the socket.

5 A shaft extends through the bore of the body and has respective first and second end portions that communicate with the body end portion. The shaft is partially externally threaded and rotates relative to the body. The partially externally threaded portion of the shaft engages an internally threaded
10 portion of the body at the bore.

A plurality of locking members are attached to the shaft at a first end portion of the body. The locking members can be attached to a plate mounted to the first end portion of the shaft.

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5 The locking members are movable between extended and retracted positions responsive to a rotation of the shaft. Rotating the shaft in either of two selected direction can either move the locking members from an extended to a retracted position or from a retracted to an extended position.

10 In the locking position, the locking members extend radially beyond the outer surface of the body and the selected diameter. This enables the projecting, locking members in the extended position to engage one side of a selected member or members to be held together (wall, panels, flanges, etc). A fastener such
25 as a nut is then connectable to the body at a partially externally threaded portion and opposite the locking members. The nut can then be tightened against the locking members so that compression can be applied to the shaft for holding the selected structures, flanges, panels together or for attaching the
30 apparatus to a selected structure (wall, flange, beam, etc).

The apparatus of the present invention can be used to form an attachment to a wall, panel, beam, plate, slab or other structure by inserting the body through an opening in the

selected structure when the locking members are retracted and then moving the locking members to an extended position so that they can form an attachment to the selected structure at one end portion of the opening (see Figures 9-11). At the opposite end
5 portion of the opening, the nut can be attached to the body and threadably engaged thereto for supplying compression to the body and for holding and anchoring the entire apparatus into a selected position at the opening (see Figures 11 and 13).

BRIEF DESCRIPTION OF THE DRAWINGS

10 For a further understanding of the nature, objects, and advantages of the present invention, reference should be had to the following detailed description, read in conjunction with the following drawings, wherein like reference numerals denote like elements and wherein:

15 Figure 1 is a side view of the preferred embodiment of the apparatus of the present invention;

Figure 2 is an end view taken along lines 2-2 of Figure 1;

Figure 3 is an end view taken along lines 3-3 of Figure 1;

20 Figures 4-4A are sectional views taken along lines 4-4 of Figure 1;

Figure 5 is a partial, perspective, exploded view of the preferred embodiment of the apparatus of the present invention;

Figure 6 is a sectional view taken along lines 6-6 of Figure 1;

25 Figure 7 is a partial sectional view of the preferred embodiment of the apparatus of the present invention;

Figure 8 is a partial perspective view of the preferred embodiment of the apparatus of the present invention;

30 Figures 9-11 are sectional elevation views of the preferred embodiment of the apparatus of the present invention showing a sequence of attachment to a pair of panels, each having an opening, the openings being aligned;

Figure 12 is a fragmentary view of the preferred embodiment

of the apparatus of the present invention illustrating the extension member;

Figure 13 is a perspective, partially cut away elevation view of the preferred embodiment of the apparatus of the present invention showing it in use with the extension of Figure 12 and holding two spool pieces together at ring type joint weld neck flanges.

DETAILED DESCRIPTION OF THE INVENTION

Figures 1-11 show the preferred embodiment of the apparatus of the present invention designated generally by the numeral 11 in Figures 1 and 9-11. Fastener apparatus 10 includes a body 11 that has external threads 12 and a central longitudinal bore 13. The external threads 12 can be provided of a first diameter along a majority of the length of the body 11. A second threaded portion 28 is of a smaller diameter than the threaded portion 12 as shown in Figure 1. As will be described hereinafter, an extension 35 can attach at threads 28.

A shaft 14 is mounted in the central longitudinal bore 13 of body 11. Shaft 14 has external threads 15 that engage internal threads of central longitudinal bore 13. In this fashion, when the shaft 14 is rotated, it also moves a slight distance linearly because of the engagement of the external threads 15 of shaft 14 and the internal threads of body 11 at central longitudinal bore 13. This threaded engagement functions as a stop in one (clockwise) direction.

Shaft 14 has a threaded end portion 16 that receives locking nut 17. The opposite end portion of shaft 14 provides end portion 27 having a tool receptive socket 26.

A circular plate 18 is shown in Figures 1-5 having a plurality of pegs 22 and a central internally threaded opening 19. A plurality of locking members 20 are mounted respectively on the plurality of pegs 22 as shown in Figures 3-5. Each locking member 20 has a pivot hole 21 that enables the locking member to be pivotally mounted upon a peg 22. In Figure 4, the rotating plate 18 can be provided with three locking members 20. In Figure 4A, the plate 18A can be provided with two pegs 22 and two

locking members 20 as shown.

Body 11 has a socket 24 at one end portion thereof and a plurality of slots 23 that communicate with socket 24 as shown in Figure 8. The socket 24 is receptive of the locking members 20 when they are in the retracted position of Figures 1, 4, 4A and 6. When the locking members 20 are moved to an extended position as shown in Figure 7, the locking members 20 extend through slots 23 as shown in Figure 7. In Figure 8, the slots 23 extend radially and are circumferentially spaced as shown.

A wrench 29 (see Figures 6 and 9-11) can be used to move the locking members 20 between the retracted position of Figures 1, 4, 4A and 6 to the extended position of Figure 7. The wrench 29 can, for example, be an allen wrench that fits a hexagonal socket or other like tool receptive socket 26 at end portion 27 of shaft 14. By rotating the wrench 29 in the direction of arrow 48 in Figure 6 (counterclockwise) the shaft 14 engages the threaded portion of body 11 with its own threads 15, rotating plate 18 and pegs 22. A canning surface 25 on body 11 at socket 24 combine with the curved shape of each of the locking members 20 causes the locking members to move to the extended position of Figure 7 when shaft 14 is rotated counter clockwise relative to body 11.

During use, the apparatus 10 is first placed in the retracted position of Figures 1, 6, 4, 4-8 and 9 and then inserted through a selected opening such as the aligned openings 33, 34 as shown in Figure 9. First member 31 can have an opening 33. Similarly, second member 32 can have an opening 34 so that the fastener of the present invention can be used to hold the first member 31 and second member 32 together.

After the body 11 passes through both openings 33, 34 as shown in Figure 9. wrench 29 can be used to move the locking members 20 to the extended position of Figure 10. In this position, the locking members 20 extend well beyond the diameter of openings 33, 34 as shown in Figure 10. Nut 30 can then be attached to body 11 at external threads 12. Rotation of nut 30 enables compression to be generated against the panels 31, 32 as the nut 30 is moved closer to the projecting locking members 20 as shown in Figure 11. The nut 30 is tightened against the

projecting locking members 20.

In Figure 12, an extension 35 is shown that can be added to the body 11 as shown in Figure 13. Extension 35 has a body 36 with a central longitudinal bore that receives shaft 37. A socket 38 at one end portion of body 36 provides internal threads 49. Body 36 has external threads 39. Shaft 37 has end portion 40 with a tool receptive socket 26 that can be a hexagonal shape such as the socket 26 of shaft 14. End portion 41 of shaft 37 can be a hexagonal projecting portion that engages tool receptive socket 26 of body 11 when extension is to be used. In order to connect extension 35 to body 11, the external threads 28 of body 11 engage the internal threads 49 of extension 35. This connection can be seen in Figure 13.

In Figure 13, a pair of spool pieces 44, 45 are to be joined together. Each of the spool pieces 44, 45 provides a pipe flange such as, for example, a ring type joint weld neck flange. The spool piece 44 has flange 42, the spool piece 45 has flange 43. Each of the flanges has bolt openings through which the apparatus 10 of the present invention is inserted for forming a connection. The flange 42 has bolt hole opening 46. The flange 43 has bolt opening 47. As with the illustration in Figures 9-11, the combination of body 11 and extension 35 are placed through the openings 46, 47 as shown in Figure 13. A wrench 29 has then used to rotate shaft 37 which is connected to shaft 14 and also rotates it. In this fashion, the projecting locking members 20 can be moved to the extended position so that they extend will beyond the diameter of bolt hole opening 46 as shown in Figure 13. Nut 30 can then be added to the external threads 39 of extension 35 as shown in Figure 13 and tightened for pulling the flanged spool pieces 44, 45 together as indicated schematically by arrows 51 in Figure 13. The present invention can be used to join structures, such as spool pieces together in crowded areas (eg. oil platforms, refineries) wherein access to each flange may be limited making conventional tools useless.

PARTS LIST

The following is a list of suitable parts and materials for the various elements of the preferred embodiment of the present invention.

	<u>Part No.</u>	<u>Description</u>
5	10	fastener apparatus
	11	body
	12	external threads
	13	central longitudinal bore
10	14	shaft
	16	threaded end portion
	17	locking nut
	18	circular rotating plate
	19	opening
15	20	locking member
	21	locking member pivot hole
	22	peg
	23	slot
	24	socket
20	25	cam surface
	25A	cam surface
	26	tool socket
	27	end portion
	28	external threads
25	29	wrench
	30	nut
	31	first member
	32	second member
	33	opening
30	34	opening
	35	extension
	36	body
	37	shaft

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38	socket
39	external threads
40	end portion
41	end portion
42	pipe flange
43	pipe flange
44	spool piece
45	spool piece
46	bolt hole
47	bolt hole
48	arrow
49	internal threads
50	external threads
51	arrow

The foregoing embodiments are presented by way of example only; the scope of the present invention is to be limited only by the following claims.